Electrical and Electronic Engineering Technicians

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What They Do

Electrical and Electronic Engineering Technicians perform work essential to research and development, manufacture, modification, and maintenance of a wide range of products and equipment. They usually work as assistants to engineers and are often identified by titles similar to those given to the engineers. Some common titles are Design Engineering Technician, Systems Development Technician, and Product Engineering Technician. Experienced technicians often work in research and development.

Engineering Technicians use their knowledge of electronics theory and circuitry, test procedures, mathematics, and physics to sketch, make layouts, and build experimental circuitry, prototype and production models, and production equipment. They design and modify basic circuits, and recommend changes in circuitry or specifications. They troubleshoot failed units, often down to the level of the individual components, analyze the cause of failures, and perform necessary repairs. They use voltmeters, ohmmeters, signal generators, ammeters, and oscilloscopes.

Engineering Technicians set up and run a variety of environmental, operational, and functional tests on components, systems, and new products, and sometimes devise new test procedures as well. They analyze and interpret test data, write technical reports, develop graphs or charts to describe operating characteristics, failures, and limitations for the engineers to consider. They may also write computer programs to test new systems. They also may run diagnostic programs that help pinpoint malfunctions.

Some Engineering Technicians are primarily involved with the manufacturing process. They maintain production and quality control equipment, develop tests to assure product quality, and investigate various manufacturing problems. Other Engineering Technicians install and maintain equipment and systems at customer worksites. In addition to providing preventive and corrective maintenance, they often train the customers' employees and advise them of proper procedures to avoid unnecessary equipment breakdowns.

Tasks

Electrical Engineering Technicians

- Provide technical assistance and resolution when electrical or engineering problems are encountered before, during, and after construction.
- Assemble electrical and electronic systems and prototypes according to engineering data and knowledge of electrical principles, using hand tools and measuring instruments.

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Electrical and Electronic Engineering Technicians

- Install and maintain electrical control systems and solid state equipment.
- Modify electrical prototypes, parts, assemblies, and systems to correct functional deviations.

Electronic Engineering Technicians

- Test electronics units, using standard test equipment, and analyze results to evaluate performance and determine need for adjustment.
- Perform preventative maintenance and calibration of equipment and systems.
- Read blueprints, wiring diagrams, schematic drawings, and engineering instructions for assembling electronics units, applying knowledge of electronic theory and components.
- Identify and resolve equipment malfunctions, working with manufacturers and field representatives as necessary to procure replacement parts.

*Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Important Skills, Knowledge, and Abilities

- Troubleshooting — Determining causes of operating errors and deciding what to do about it.
- Repairing — Repairing machines or systems using the needed tools.
- Equipment Maintenance — Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- Equipment Selection — Determining the kind of tools and equipment needed to do a job.
- Time Management — Managing one's own time and the time of others.
- Mathematics — Using mathematics to solve problems.
- Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.

Electrical and Electronic Engineering Technicians

Work Environment

Most Electrical and Electronic Engineering Technicians work in offices, laboratories, and industrial plants. The laboratories are very clean and well equipped facilities because of the materials they work with, such as silicon chips that must be completely free of contamination. Those that work in manufacturing or industrial plants may be exposed to hazardous materials that are used in their operations. Teamwork is a very important part of the operations for a technician.

Electrical and Electronic Engineering Technicians usually work a standard 40-hour workweek, Monday through Friday. However, they may work swing and night shifts at plants that operate around-the-clock. Occasionally, Electrical and Electronic Engineering Technicians may work overtime hours to meet production deadlines.

California's Job Outlook and Wages

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2004	Estimated Number of Workers 2014	Average Annual Openings	2006 Wage Range (per hour)
Electrical and Electronic Engineering Technicians				
17-3023	25,700	30,400	1,010	$19.86 to $31.30

Wages do not reflect self-employment.
***Average annual openings** include new jobs plus net replacements.*
Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

The occupation of Electrical and Electronic Engineering Technicians will grow faster than average compared with all occupations in California, with the greatest number of job opportunities created by workers retiring or permanently leaving the field. The largest growth is projected for the employment services and computer systems design industries.

Training/Requirements/Apprenticeships

Most employers expect applicants to have an associate degree in electronics technology or equivalent technical training.

Technicians often find it valuable to take additional courses and study technical manuals to keep up on the frequent changes and developments in the field of electronics. They should be detail-minded and have the initiative to work independently much of the time. They should be able to work from schematic diagrams, sketches, and verbal instructions. Good communication skills, both oral and written, are necessary, since reports and verbal explanations are usually part of the job. Other important traits are manual dexterity, good vision, and color perception.

Many of California's community colleges offer degree programs in electronics technology, as well as courses in related subjects. Technicians who work on radio transmission equipment are required to obtain a radiotelephone operator's license issued by the Federal Communications Commission. They may prepare for this license at most community colleges or through home-study courses.

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A four-year Electronics Technician apprenticeship program run by the California Department of Industrial Relations, Division of Apprenticeship Standards is in effect in various locations throughout California.

Recommended High School Course Work
High school students interested in this kind of work should take as many mathematics and science courses as possible. Computer technology, electronics, and shop classes are also helpful.

Where Do I Find the Job?

School placement offices may help students find jobs. School counselors and job service agencies may have information on apprenticeships and jobs. Beginning technicians can apply to the personnel departments of large manufacturing, engineering, or contracting firms. Federal, state, local government and private employment agencies also list jobs. Newspapers, professional journals, trade publications, and the Internet may list openings. Some companies hire beginning technicians as temporary workers. After three to six months, if their work is satisfactory, they may become a regular employee of the company.

Direct application to employers remains one of the most effective job search methods. Use the *Search for Employers by Industry* feature on the *Career Center* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. Search using keywords from the following manufacturing industry names to get a list of private firms and their addresses:

- Analytical Laboratory Instruments
- Bare Printed Circuit Board
- Broadcast & Wireless Communication Equip.
- Computer Systems Design Services
- Electricity & Signal Testing Instruments
- Electromedical Apparatus
- Engineering Services
- Industrial Process Variable Instruments
- Other Electronic Component
- Other Measuring and Controlling Devices
- Search, Detection, & Navigation Instrumnts
- Semiconductor and Related Devices
- Testing Laboratories

Search these **yellow page** headings for listings of private firms:

- Electrical Power Systems Testing
- Electric Contractors
- Electric Service & Utility Providers
- Electronic Testing Equipment
- Electronics Consulting & Research Dev.
- Engineers-Communication
- Engineers-Electrical
- Engineers-Electronic

Where Can the Job Lead?

Engineering Technician occupations have limited promotional opportunities. Persons in these occupations must take additional college courses and obtain a degree in order to be promoted to the engineering occupations. Lateral movement is quite easy and there seems to be a wide range of technician occupations that one can move into with very little difficulty. With the proper educational preparation, the primary advancement is from a technician to an engineer.

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Other Sources of Information

Institute of Electrical and Electronics Engineers, Inc.
www.ieee.org

American Society for Engineering Education
www.asee.org

Electronics Technicians Association, International
www.eta-i.org

Junior Engineering Technical Society (JETS)
www.jets.org

American Society of Certified Engineering Technicians
www.ascet.org

California Department of Industrial Relations
Division of Apprenticeship Standards
www.dir.ca.gov/das

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